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Communicating and Selling Skills (Page-17)

19th Issue

Learning & Guiding

Editorial Note

It is our 19th edition, and we are incorporating some of the interesting topics in this edition, I, my staff and our mentor Engr. Qazi Arsalan Hamid wants to thanks all readers who are giving us continuous feedbacks and participating in this voyage of learning, Me and my team never acclaimed to be best but we are trying to be different we made this noncommercial platform for all engineers, who are willing to express their talent of authorship. Please read this edition, participate and identify the areas of improvement.

Engr. Taiba Azhar Shaikh

Feedbacks

** Improved and interesting.*
(Engr. Habib Nasir)

** I amazed to see lot of negative feedbacks from different readers, i think they are more interested in negative energy propagation, we need to support these engineers who are working for improvement of our community.*
(Engr. Tazeen Arif)

** Please add more engineering sections, this magazine is limited to Electrical Engineering Field. (Engr. Hamza Khan)*

**. Good Work. (Engr. Zubair Athar)*

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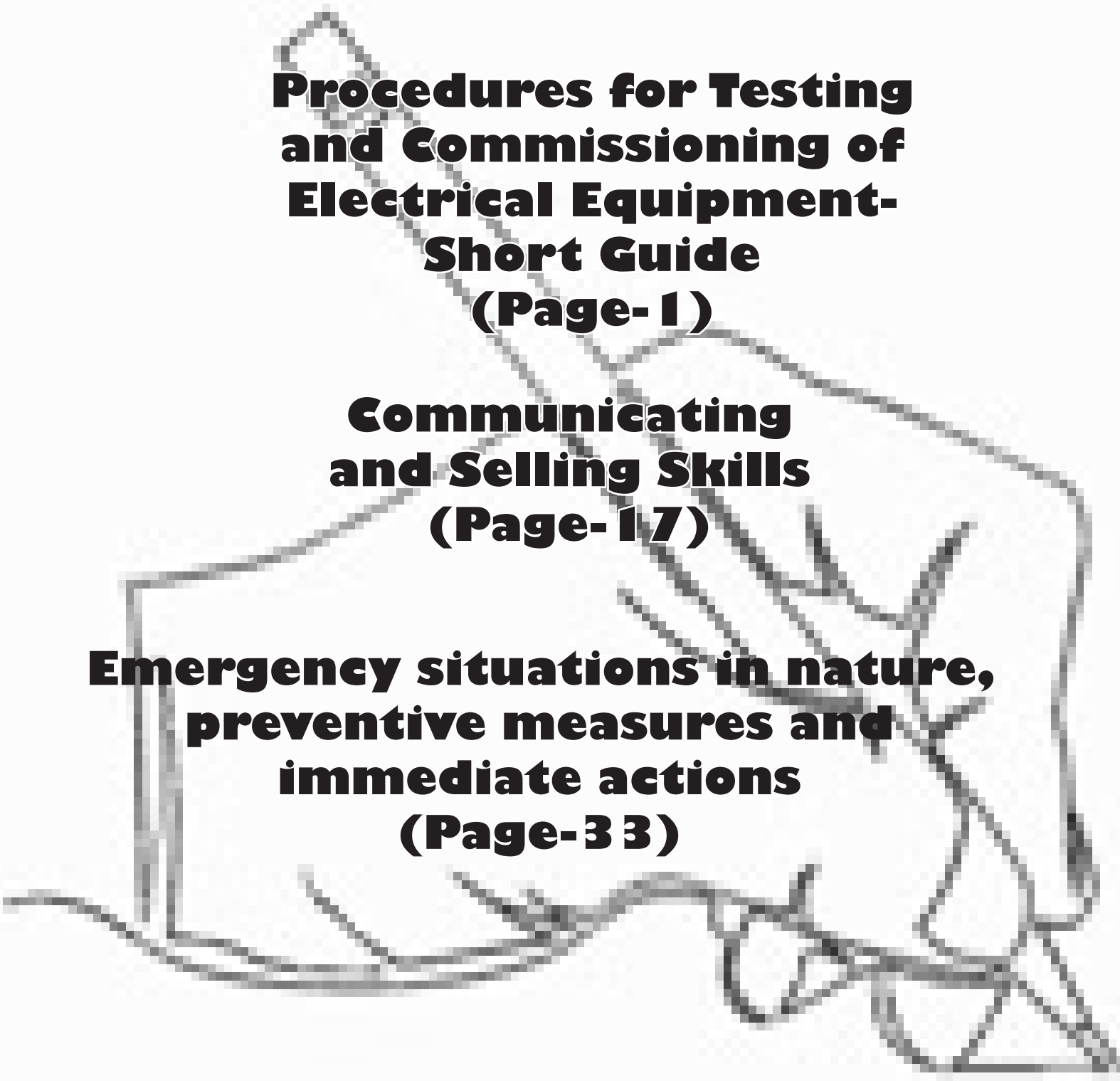

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Procedures for Testing and Commissioning of Electrical Equipment- Short Guide

Emgr. Qazi Arsalan Hamid

The aim of testing and commissioning is that all tested electrical equipment and systems supplied are operational and within applicable standards and tolerances, the additional aim is that equipment and systems are installed in accordance with design specifications.
There are two categories of Test.
1.Optional
2.Mandatory

Mandatory Testing is also called Acceptance Testing, Acceptance Testing is then categorized in two classes.
1. Factory Acceptance Test (FAT)
2. Site Acceptance Test (SAT)

The responsibilities of Testing and Commissioning Engineer are
1. Safety of All staff involved in Testing
2. Safety of Equipment
3. Report development as per the Test results
4. Recommendations for equipment under test(i.e. is it ok as per specification and system?)

Inspection is the important part of any testing, proper inspection also ensure the safety initial precaution of

Testing Team and Equipments.

Safety procedures must be reviewed at every time of Testing activity, There is one misconception that Safety engineer is responsible for Safety precautions, totally wrong concept. The only responsible person of safety is the person who is performing a job or involved in it. Safety engineer only checks the defined safety precautions. Now the question is who will define the safety precautions, off-course Testing engineer will define them and safety engineer will ensure them.

Now let start, We will do test insulation resistance test first, before defining the procedure, we need to understand why IR Testing is necessary? This test main purpose is to designate the current insulation condition of our equipment's insulation medium, let suppose we have unit residential transformer, which bushing insulation is deteriorated, although in last IR test during maintenance, our engineer informed that Transformer bushing insulation is not ok, we thought it will work till next maintenance, now what will be the consequences?

A. Oil leakage from the bushing
B. Fire eruption
C. Damage of $1000+ Asset
D. loss of revenue due to unwanted, undesired but developed power interruption

The same case you can think about underground cable, I will generally consider equipment for IR testing, that equipment may be Transformer bushing, Underground Cable, Reactor bushing, Generator bushing, etc. Now general thought in any one mind is that why not I am considering Transformer oil in IR testing, because Testing of Transformer insulating oil is done by different or better we say high voltage method.

Test equipment is megger IR Tester.
I selected 5KV IR Tester for this task. Now before starting of any test, you need to see safety precauti--ons.
I am mentioning minimum safety precautions here, but you need to follow as much as defined in your system.

1. A visual inspection to be made to ensure the surface dust and moisturehas been removed from the component under test.
2. Ensure the component is isolated from other connected system, which may feed back to other components or circuits not under test.
3. A check shall be made to verify the ground for the component under test and test equipment being connected to system ground and equipment like Lightning arrestor, capacitor and VT/ control transformer to be isolated.

Insulation Test: Insulation tester leads shall be connected between one phase conductor and earth.

Test voltage shall be selected according to mention below. The duration could be 1min to 10min, and the reading shall be taken after this duration. Before disconnecting the test leads test object shall be discharged through ground. The same procedure shall be followed for other phases.

Rated voltage	Test voltage
100-1000V AC/DC	1000V DC
>1000 to <5000V AC	2500V DC
> 5000V AC	5000V DC

Influencing factors:

Insulation resistance value is influenced by various factors like temperature, humidity, and moisture. The ambient temperature value shall be noted during test. The relation between temperature and insulation resistance is inversely proportional.

Test methods:

1. Short time or spot reading:

In this method the megger instrument is connected insulation to be tested andis applied for 60sec. The reading is recorded at the end of that time.

2. Time resistance method:

In this method the testing is fairly independent of temperature provides considerably more information about the condition of insulation than the spot measurement. The test voltage shall be applied for 10minutes and readings are taken every 15sec for the first minute and every minute for 10 minutes. Dielectric absorption factor, polarization index could be calculated as below,

Dielectric absorption factor=60sec reading/ 30sec reading.

Polarization index = 10min reading / 1min reading.

The insulation condition could be categorized as shown in the table mention below.

Insulation condition	10min/1min Ratio (Polarisation Index)
Dangerous	<1
Poor	>1 to <1.5
Questionable	>1.5 to <2
Good	>2 to <4
Excellent	>4

3. Step or multi- voltage method:

This method requires a multi voltage megger instrument, preferably with 1:5 voltage ratio ranges. Any reduction of insulation resistance at higher voltage is a sign of an insulation weakness.

ACCEPTABLE LIMITS:

Value of insulation resistance should meet the manufacturer minimum. If this value is not available, the component tested should have at least one Meg Ohm for every 1000 volts of rated voltage plus an additional one Meg ohm.

Max.Voltage Rating Of Equipment	Megger Size	Min.IR Value
250 Volts	500 Volts	25 MΩ
600 Volts	1,000 Volts	100 MΩ
5 KV	2,500 Volts	1,000 MΩ
8 KV	2,500 Volts	2,000 MΩ
15 KV	2,500 Volts	5,000 MΩ
25 KV	5,000 Volts	20,000 MΩ
35 KV	15,000 Volts	100,000 MΩ
46 KV	15,000 Volts	100,000 MΩ
69 KV	15,000 Volts	100,000 MΩ

2. HIGH VOLTAGE TEST

This Test i will conduct on Switchgears and Cables,
What is the objective of this Test?
"To determine the equipment is in proper condition to put in service, after installation for which it was designed and to give some basis for predicting whether or not that a healthy condition will remain or if deterioration is underway which can result in abnormally short life."
I need two equipments for this Testing,

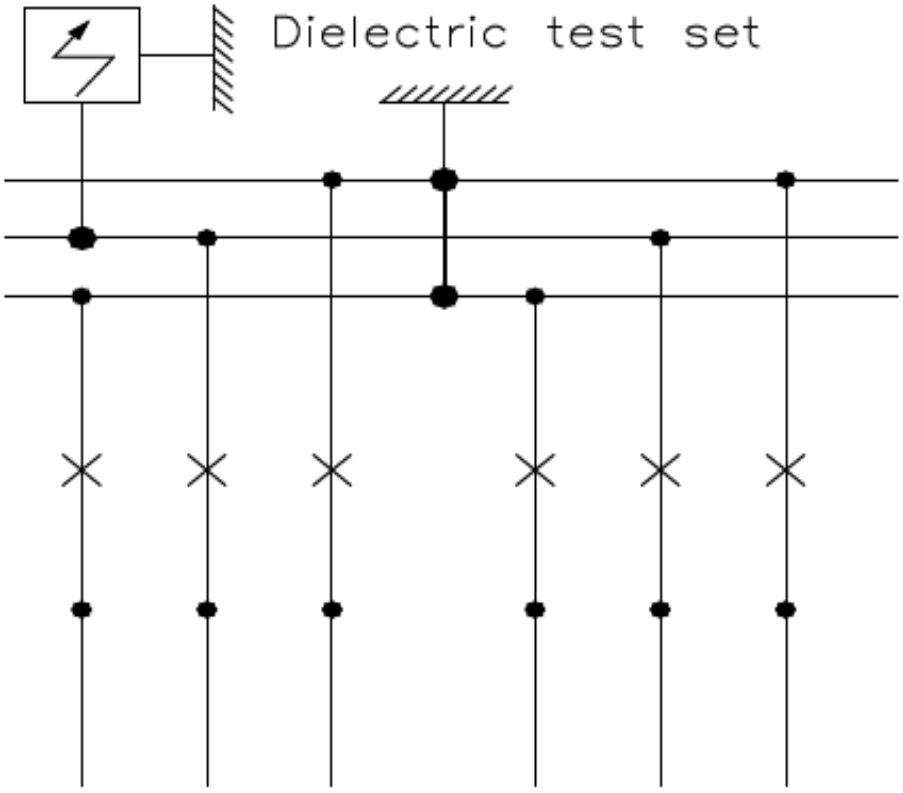
1. Calibrated AC hi-pot test set for switchgear with leakage current indicator and overload protection.

2. Calibrated DC hi-pot test set for cables with leakage current indicator and overload protection.

Test Procedure for SWITCHGEAR:
It includes panel enclosure, bus bar, CT & breaker / contactor. The following precautions should be taken care, before starting the test:

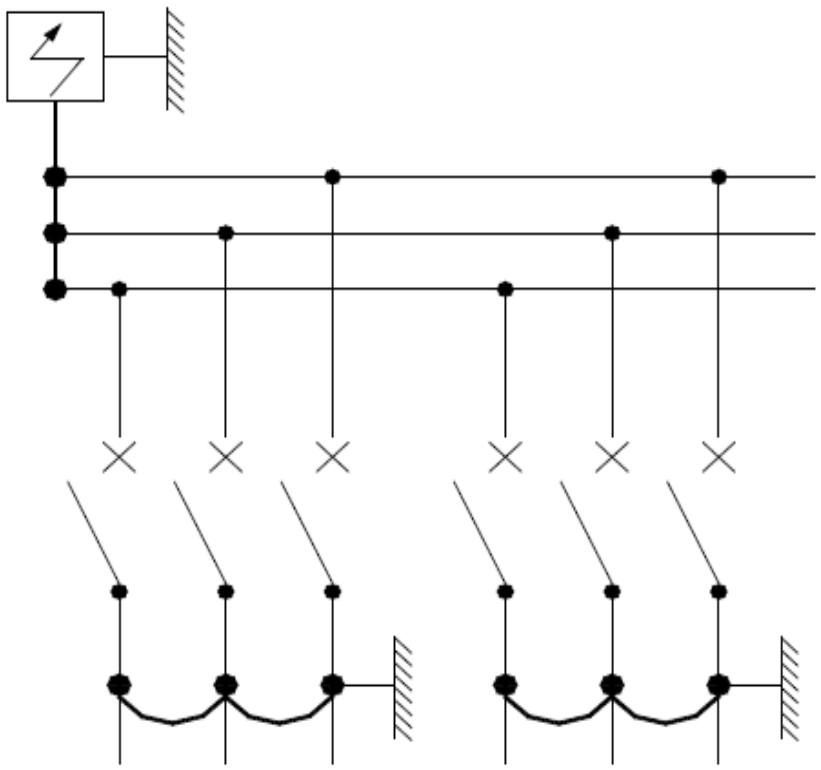
- A visual inspection will be made to ensure the surface dust and moisture has been removed from the component under test.
- Ensure the component is isolated from other connected system, which may feed back to other components or circuits not under test.
- A check shall be made to verify the ground for the component under test and test equipment being connected to system ground.
- CT's secondary terminals shall be shorted.
- VT's & Surge arresters shall be isolated from the equipment under test.
- Mark out test area and assure nobody can enter during test.
- Circuit breakers/contactors should be inserted and closed.
- Busbars should be fully mounted tightened and shields between phases & between phases and earth should be in place. Moreover, busbar covers should be in place.
- All earthing switches related to equipment under test should be open.
- Busbar conductivity test shall be performed.
- Insulation resistance test should be performed before and after commencing the test.
- Instructions of test equipment being used should be

followed.
- After each test subject under test should be discharged to ground.
- The test connection shall be made as shown in the figure.



lRequired test voltage shall be raised slowly and maintained for one minute between one phase and other phases connected to ground and than reduced slowly to zero, testing shall be repeated for other phases as mentioned above. During each test leakage current shall be recorded.
After the above test, another test shall be repeated after

opening all circuit breakers / contactors and applying test voltage across opening distance between poles with three poles shorted on both sides and grounded on one side only as shown in the figure mention below



Test voltage limits are mentioned in table given below.

Rated voltage (KV)	Rated I min. power frequency withstand voltage (KV)	Test voltage at field =80%KV
7.2	20	16
17.5	38	30.4
36	70	56

Test Procedure for POWER CABLE:

Following precautions shall be made before conducting test.

- Cable under test should be clean and free of dust especially at insulators and stress cones.
- Shields of all cables should be grounded and tied together at the near end of the cable and at far end bare conductor should be taped with some insulation.
- Cable under test should be disconnected at both ends. This will assure that the cable under test will not feed back to circuits / components not under test.
- Personnel should be stationed at both ends and / or the end opposite where the test is performed should be barricaded with warning tapes & signboards.
- Instructions of test equipment being used should be followed.

DC Voltage Test:

Dc voltage shall be raised slowly up to 4 x Uo (rated power frequency voltage between conductor and earth or metallic screen) and maintained for 15 minutes between one phase and other phases and metallic screen of all phases connected with ground. After elapse of test time, voltage shall be reduced slowly to zero and the cable shall be discharged. Testing shall be repeated for

other phases as mentioned above. Test voltage limits are mentioned in mention below table as per IEC 60502-2

Rated Cable voltage (KV) Uo (Phase to earth)	Test voltage for 15min DC voltage (KV)
3.6	14.4
6.0	24
8.7	34.8
12	48
18	72

AC Voltage Test (Alternate method):

As per IEC 60502-2(1997-04), as an alternate method after agreement between the contractor and purchaser, an a.c voltage may be applied as a) or b) below:

a) Test for 5min with phase-to-phase voltage of the system applied between the conductor and the metallic screen

b) Test for 24 hours with the normal operating voltage Uo of the system.

Note: Normally cables have three voltages specified: i.e. Uo\U\Um

Where Uo=rated Phase to earth/screen voltage

U= rated Phase to phase voltage

Um=rated maximum Phase to phase voltage

-For cables used for solidly earthed system screen current for the earth fault will be high but cable Uo rating is low i.e. Uo=U/1.732
-For cables used for resistance earthed system screen current will be low for earth fault but cable Uo rating is high i.e. Uo=U

Note:
A VLF (Very Low Frequency) high voltage of 3xUo shall be applied between conductor and screen. Some utility customers are accepting this.

ACCEPTANCE LIMITS:
For Switchgear:
No flashover or disruptive discharge should occur during test. Corona discharge noise may be heard during this test.

Rated voltage (KV)	Rated I min. power frequency withstand voltage (KV)	Test voltage at field =80%KV
7.2	20	16
17.5	38	30.4
36	70	56

For Power cables:
No flashover or disruptive discharge should occur during test.

Rated Cable voltage (KV) Uo (Phase to earth)	Test voltage for 15min DC voltage (KV)
3.6	14.4
6.0	24
8.7	34.8
12	48
18	72

Note: For old switchgear(not cables) the test voltage shall be reduced according to the age.

APPLICABLE STANDARD:

IEC 60298: - AC metal-enclosed switchgear and control gear for rated voltage above 1KV to 52KV.
IEC 60694: - Common specifications for HV switchgear.
IEC 60502: - Power cables with extruded insulation and their accessaries from 1KV up to 30KV.

(This is end of part-1 of this Guide, this short guide is written for Testing and commissioning Engineers-Medium Voltage/Utility, O-Engineers published it with permission of Engr. Qazi Arsalan Hamid)

Communicating and Selling Skills


Engr. Shahid Iqbal

Dear Young Sales Engineers:
It's a universal truth that there is no shortcut to experience. But we can educated our youngsters to learn early. According to my experience, our customers are the best educators. Luckily if you get a good boss at very first stage of your career, that's not less than a blessing from Almighty Allah. Today I would like to address interactive/communication techniques while attending your customers and will describe briefly starting from A to Z. A Good sales person should be a GOOD COMMUNICATOR. It's all what I observed from different segments of my experience.

A. for APPROACH:

You may phrase it as attitude. Normally "Attitude" considered to be negative so I preferred to use Approach. A good communicator is always confident and positive in his approach. Approach/Attitude is very much related to giving respect to customers/colleagues and all concerned. Sales person should respect the words of customer even customer is absolutely wrong. You may disagree but with due respect you can manage by saying "Sir/Madam you are right and may I request you to kindly consider this also" (and then you can narrate your view point in a very humble way with full

confidence). I personally noted at number of places, where sales person was right and even then he lost the deal. This communication technique involves respect for oneself and respect for others too.

B. is for BODY LANGUAGE:

I personally consider it a very vital tool to communicate with anyone to whom you interact. It's very important that whether your body language is supporting your speaking language. It has been validated that while communicating, your body language plays more than 60% role to influence your customer and to communicate effectively. Your every action is important while communication. How you walk, how you sit, how you talk, tone/pitch of your voice, how you use your body parts to communicate effectively in a positive way. Once I addressed for three hours on body language to my sales team, explaining them how to use this very tool while attending your customer face to face or on phone call.

C-is for Concise:

It has been noted that mostly sales person do overselling while communicating with customer about the product/ services etc. Mostly customers do not like especially

Mr. Bottom Line (a Customer Type) even hates it. So sales person should adopt K.I.S.S technique. i.e.
K----Keep
I-----It
S----Short &
S----Simple
While communicating sales person have to be more observant toward customer interest. Let the customer speak. Always try to gather maximum information from the customer by putting "to the point" questions.
Now please see below and I will describe. Please do not proceed reading just for one minute and think "What It means" as written below. Please stop and think.

What

It

Means

Hope you waited for a minute to understand above. Above example is very much related to out today topic i.e. CONCISE. Above figure educate us that "Concentrate-Between-The-Lines".

It means, be very specific about the topic/product/ services, being discussed with the customer instead of wasting time in non-relevant subjects. Any customer can absorb/digest specific amount of information at a time. So our message should be short and crystal clear.

D-is for Direct:

Always try to interconnect with customer by visiting him/her personally. At initial stages our communication through writing/phone calls/by any colleague etc., may not convey the exact and particular message, which you want to be communicated, due to any reason. We should know & own the words, being utilized during face to face meetings. Your welcoming/positive words would attract customer attention, enabling him to treat your words as you want to be treated. Face to face interaction helps to build your actual TRUST more than by any other means. Give maximum space and different options to your customers to decide meeting time/date/ venue etc. suits him/her the best. If customer asks for any refreshment, always say YES, enabling you spend maximum time with the customer.

Although it's not exactly related with heading, always try to keep details of the competitors e.g. vehicle number/ name of sales person etc. Try to check, who has already

visited while putting your entry on gate keeper register. While walking through customer parking we may check competitor vehicle, if we remember make/ model/registration number of our contestant. We may try to get such information while interacting with any receptionist. We must built friendly relations with such unpredicted helpers for your deal.

E is for Eye Contact:

Very very important act, while dealing customer during face to face interaction. Our eye contact illuminates our level of confidence. It has been established that a customer does not listen properly to a sales person, who have a bad eye contact. We must not see surroundings while sitting and communicating in front of customer. Some customer hates it and this act may damage your deal. Eye contact also indicates our business interest in that very deal. We can judge more about customer involvement in discussion with better eye contact.

F-is for Feedback:

Basically it is the response from customer side, which entirely depends upon how we are engaging our customer. It also indicates how much, we succeeded to involve customer in the deal. An early feedback is very

good and gives us chance to be “more to the point and precise”.
Getting an early feedback is very positive act for sales deal and for sales person as well. Delay in feedback from customer is not a good sign. Feedback must be considered as KPI for the sales persons. Feedback is too much important whether it’s positive or negative. It helps to present our viewpoint according to customer requirements.
Some customers’ delay feedback due to any reason, designated as Mr. Silent. Silent customer must be targeted on priority. Mr. Silent is one of the most difficult customer to handle. We will discuss “How to handle Mr. Silent” later on as it’s a complete chapter.
To get customer feedback, we have to be very vigilant. Every customer is not our customer and at the same time, that may be our customer next time. Always give more space to your customers for expression of their honest thoughts, which may not be in our favor this time but would be beneficial for our future interactions. Our every customer instils us and it’s depends, how much share we got.

G-is for Guessing:

Guesswork never been appreciated during sales deal.

Always get correct and exact statistics from customer to move forward. Don't believe of your own suppositions/ assumptions in view of any previous practice. Every deal is a new deal. You may get some similarities in different deals but use your experience to be very specific and to the point to get the deal in minimum possible time. Guesswork may damage your deal severely.

H-is for Head/Heart:

We must communicate from head as well as from heart. There may be some sensitive situation arises during the deal, and we have to take care and handle the same precisely and carefully. Sensitive matters should be dealt honestly. Honest people always consider others feelings before determining how to address sensitive items.

I-is for Interruptions:

Keeping in mind the natural aspect of human beings that everyone needs to be listen properly and does not like to be interrupted. Interruption in very much irritating factor, while communicating with decision makers/CEOs. More Than 90% CEOs hate to be interrupted but unfortunately many sales person make such mistakes due to any reason or to impress their customers. So always remember not to interrupt while

your customer is communicating about the deal or about his reservations/concerns which always help the sales person to know more about customer objectives.

J-is for Judgment:

Always try to explore the factual statistics, which leads you to right course instead of making and depending on Judgments. Never try to pass any judgment, which can really destroy real exchange of views/deal. Revisit your exact findings/documents to clarify and to approach righty.

K-is for Kindness:

Kindness always help and open doors to proceed in the right direction from the very first visit/call to your customer. Without this gesture, customer will not welcome you properly. If anyone cannot talk politely, it would be better to leave this profession. Your polite and courteous interactions always ease your targets and also help to maintain your good relationships with any customer on long term basis. Kindness always proved to be a positive tool and creates more absorbing capacity within sales person. I would like to share my personal experience for a very specific corporate customer from telecom sector.I used to visit that customer regularly

but could not get any business. I never gave up and keep my focus. After about one and half year I got an order of seven power generators and got zero commission. At that moment I was too happy and consider myself successful. After that we succeeded to sell thousands of generators to that company. During this deal I have to face many odd attitudes and I took those as challenge. Major tool which helped me to secure that order (as revealed by the deciding authority) was kindness/polite attitude toward nastiest attitude.

L-is for Listening:

Listening is very very important and vital organ of selling. I deliberately used the word "organ". A sales person always speaks more than his listening capacity. Almighty Allah created human being with one tongue and two ears. What it indicates that one should speak less and listen more. Listen and silent make up of same words. To listen one has to be silent. Listening is very vital and more than that is to be "active listener". An active listener never skips customer objectives and buying signals during interactions/exchange of views. Salesman body language including face impressions convince customer to know about genuineness of sales person for any deal. Never underestimate the person

across the table.

M-is for Mood:

Our feelings always influence our way of communication and presentation. Mood of sales person should always be receptive and friendly. Also while communicating with your customer, always observe customer mood keenly. You can assess the mood of customer by his body language including face impressions, voice tones etc. Sales person smiling face can be more helpful to proceed communications.

N-is for Normal:

There are some sales persons, who don't control their sentiments and thoughts during discussions with customers. Due to impulsive by nature, they react in confused way resulting loss of self-confidence. One should avoid to react in such way and should improve his/her body gesture and sentiments by staying normal and confident. Normal attitude helps to control situations in such circumstances.

O-is for Openness & Objectives:

Openness is good and should be utilized carefully. Sometimes disclosing unwanted facts create

complications/problems. A sales person should be honest with his customers to meet their objectives. Sales person should be objective while handling customer's objectives. To push customer for your product (which doesn't suits him/her) will destroy your trust. Always try to think from customer viewpoint, which will help you, what and how much to reveal to your customer to get your deal by offering him genuine products, suits their needs.

P-is for Perception:

Everyone has his own perception. Always try to avoid to challenge perception of your customer directly. You may convey your message by any other means e.g. presenting genuine examples. One of my previous article i.e. "An interesting Sales Call" would be helpful to understand more, where I even supported customer unrealistic viewpoint. Understanding by heart, that customers have different perception and to respect that is a vital step in developing trustworthy relationships by keeping their privacy as well. Sales person should be good absorbent and flexible while communicating. Polite & positive exchange of words empower your genuine perspective which always impact your customer to believe in you. To negate customer perception directly without any logic

may harm your deal.

Q-is for Questioning:

Exact questioning is very important during sales proceedings. Sales person should be very much clear about questions to be asked from customer. Selection/ choice of questions defines a way to mature sales deal. So draft smart questions before interacting with the customer. Always try to get maximum information from customer by putting logical and transparent questions. Always use Questioning art by putting right question at right time. Questioning should be in a very friendly atmosphere/manner and also involve your body language. Keenly observe the answers and note down the priorities/interest of customer. Customer's answers leads you to the victory stand, subject to your better understandings. Give space to customer to answer your queries. Don't try to enforce customer to answer your every question. No answer to any question is also an answer.

R-is for Relationship/Rapport:

While communicating it depends upon the sales person how early he/she develop friendly relationship/ association with customer. It's always very vital to take

successive start and is a continuing process. One may face many ups and downs while building and carrying such relations. Always take care of your relations with trust/faith/assurance.

S-is for Summarizing:

It's always beneficial to keep and update notes after communicating with your customer every time regarding your sales deal. It would help you to close your deal at earliest. Missing/forgetting any important point may harm your deal. You may design a checklist for most important points. There may be some other requirements/specifications other than your standard checklist, which you should specify clearly. It's not advisable to draw a bottom-line in hurry. You may get help from your smart phone to record your minutes while communicating with your customer.

T-is for Timings:

Timings is very important during sales deal. Try to choose right time for right actions & decisions. Always give proper time to customer and preferably visit him if you feel any confusing/abnormal or unexpected gesture due to any reason. You have to be optimistic and positive oriented whenever you interact with your customer keeping in view the exact timing. Always hit at that time, when the iron is hot otherwise results may be different.

U-is for Urge:

Sales person without urge is impractical. At the same time, sales person should avoid to force his arguments

as now case may be different. So without analyzing every aspect one should not apply his predefined grounds according to his wish/desire. Impulsive acts may lead to unexpected results. Always show your accommodating and flexible attitude before your customer.

V-is for Vocal:
It should be kept in mind that while meeting with your customer not only your words, also speaking tone/pitch/loudness of your voice play an important role. Your tone should match your entire body language. Vocal shares about 40% during communication so that should be decent/welcoming and accommodating. One should know that aggressive tone don't help, even proved harmful for deal.

W-is for Win-win
Always deal with customer resulting in win-win circumstances, even if result doesn't favor you. It sounds odd but it's always important to keep your doors open to welcome your customer so that he/she always remember to call you for next opportunity with positive attitude. Next time call from customer will prove your ability, how you created win-win situation in your previous dealings.

X-is for X-Rated:
X-rated attitude always proved to be negative i.e. to create mess is not good for you in any way. Such attitude always damage relationship with customers.

Y-is for Yelp:
Yelping is also harmful. Choice of words are very much important. Always select decent words before communicating. Choice of words shows sales person approach during the deal. Exact words convey your message clearly so that customer can understand, what you want him to understand.

Z-is for Zigzag
Avoid zigzag style of communication. Customer are least concern with such talks as they need to listen clear message as per their objectives/needs. Don't try to stretch your talk by adopting such way, which will complicate actual subject and real message would be lost. Customer always ignore such type of zigzag communication. Don't adopt Zigzag style and show your ZEAL during the deal to succeed.

Emergency situations in nature, preventive measures and immediate actions

Engr. Ali Mohsin

Knowledge of the basics of survival is essential for each person. Under the survival should be understood as active expedient actions aimed at preserving life, health and performance in the conditions of autonomous existence.

These actions consist in overcoming psychological stresses, manifesting ingenuity, resourcefulness, effective use of equipment and improvised means for protection from the adverse effects of environmental factors and ensuring the body's needs for food and water. The capabilities of the human body, like all living things,

are limited and are within very narrow limits. Where is the threshold beyond which changes in the functions of organs and systems become irreversible? What time limit can people have in certain extreme conditions? What is the best way to protect a person from the adverse effects of numerous and diverse environmental factors?

Experience shows that people are able to endure the most severe natural conditions for a long time. However, a person who is not accustomed to these conditions and has fallen into them for the first time turns out to be much less adapted to life in the wild than its permanent inhabitants. Therefore, the more stringent the environmental conditions, the shorter the periods of autonomous existence, the stricter the rules of behavior must be followed, the higher the price with which each mistake is paid.

The natural environment, its physiographic conditions are important for human vitality. Actively acting on the human body, it increases or shortens the period of autonomous existence, promotes or hinders the success of survival. The Arctic and the tropics, mountains and deserts, taiga and the ocean - each of these natural zones is characterized by its own characteristics of climate, relief, flora and fauna. They determine the specifics of

human life: the mode of behavior, methods of obtaining water and food, especially the construction of shelters, the nature of diseases and measures to prevent them, the ability to move around the area, etc.
The favorable outcome of autonomous existence depends largely on the psycho-physiological qualities of a person: will, decisiveness, composure, ingenuity, physical fitness, endurance. The basis of success in the fight against the forces of nature - the ability of man to survive. But this requires certain theoretical and practical knowledge.
The basis of human survival is his conviction that he can and should preserve health and life in the most severe conditions, that he will be able to take advantage of everything that the environment gives.
Forced autonomous human survival may occur in the following cases:
landmark loss;
vehicle deprivation;
loss of a person who knows the terrain;
natural disaster. The causes of these cases may be:
natural disasters, adverse weather conditions;
transport emergency (shipwreck, plane crash);
inability to navigate the terrain;
inattention;
overconfidence.
In any case, a person must know the factors of survival in the wild.

Types of means and methods of distress alerts

Engr. Taiba Azhar Shaikh

Signal is not as easy as it may seem. Your alarm may go unnoticed. In addition, the inability to properly signal with certain types of service tools can cost you your life. All means of distress signals are divided into personnel and improvised (type of means), as well as sound, visual and radio signals (the principle of signal transmission). Their main goal is to indicate your exact location for subsequent evacuation and emergency assistance in the form of dropping food, medicine, weapons and ammunition from an aircraft.

Tabular facilities
Distress Radio (SOS). The SOS distress signal (save our souls (... - ...)) was adopted by the International Convention in Berlin on November 3, 1906, for its unimpeded reception every hour for 6 minutes (from 15th to 18th and from 45th to 48th th) at the "distress frequencies" - 500 and 2182 kHz - all radio stations of the world are silent; There is silence on the air, so that everyone who is in trouble can go on the air and give a distress signal, indicating the square of his whereabouts, or give an opportunity to catch himself. To supply this radio signal, you must have an emergency radio transmitter and know the basics of using this device and

Morse code.

Visual Signaling Tools

Pyrotechnic alarm devices:
flares;
signal checkers;
signal mortars.
These signaling devices require certain rules for use and storage, keep them away from yourself, remember that they can shoot, handle these means as with a weapon, do not repair them in case of malfunction,if a misfire occurs, do not reuse it,hold every pyrotechnic in the extended hand, turning the nozzle away from you. stay away from other people and from flammable objects, keep these tools in boxes that are protected from shocks and precipitation, give a signal from the closest distance and only when there is confidence that they will be noticed, take maximum precautions.
Signal mirror. This is a polished metal plate with a hole in the middle (5-7 mm) through which you can track the object.
The sunbeam launched by your mirror is even detected from an airplane that flies at an altitude of 2 km at a distance of 2025 km from your location. The mirror is

effective even at night, perhaps it can be called "let the lunar hares."

Improvised means of signaling

Reflectors. To indicate its location in the absence of a signaling mirror, you can use a cosmetic mirror, foil, knife blade. The more polished the plate, the further the light signal is visible.
Spread on the hill pieces of crumpled (this will increase the number of reflective planes) foil. Or attach the foil on a tree or pole on a well-viewed space, it will rotate and give signals.

Kite. A kite can also serve you well. Make a frame out of thin plates, stretch thin (preferably colored) paper on it, tie pieces of foil and bright ribbons to the snake's tail.

Signal flags. Hang on the tall trees near your camp signal "flags" - bright pieces of cloth. In order for them to be visible from above, stretch these "flags" along the ground. Tie one side of matter to the bushes growing near the reservoir, and the other to the stakes driven into the bottom of the reservoir.

Signal bonfire. If you have no flags, no foil, no pyrotechnics, or a flashlight, you can make a fire that is no worse than other means. A bonfire located in an open area or high hill is visible from afar. In the night, a brightly burning fire can be seen from a distance of 20 km when observed from the sky, 8 km - when observed from the ground. Even better, if there are several fires, the distance between them in this case should not exceed 20-30 m. However, in order for the idea to work, it is necessary to maintain a constant small fire near the fires, so you can make your “alarm” fire in a short time.

Ground Code Signals

In open areas you can lay out the code table signals. The most banal - HELP and SOS. The dimensions of a single signal must be at least 3 m. Remember, the larger the signal, the higher the probability that it will be noticed. You can make a signal from improvised means: aircraft wreckage, life jackets, clothes, logs.

You can not put the signal, and "dig." To do this, remove the sod and deepen the trench. Such signals work both day and night (at night in the grooves you can make a fire). "Scatter" signals around the periphery, the more,

, the better.

Sign code system of communication with pilots

"Landing here! We need help!" - hands up, palms inward, legs together.

"Landing is impossible! We do not need help!" - left hand up, legs together.

"Straight" - arms raised, elbows bent, palm back. Feet shoulder width apart. Wiggle your forearms backwards.

"Back" - arms raised forward to shoulder level. Palm forward.

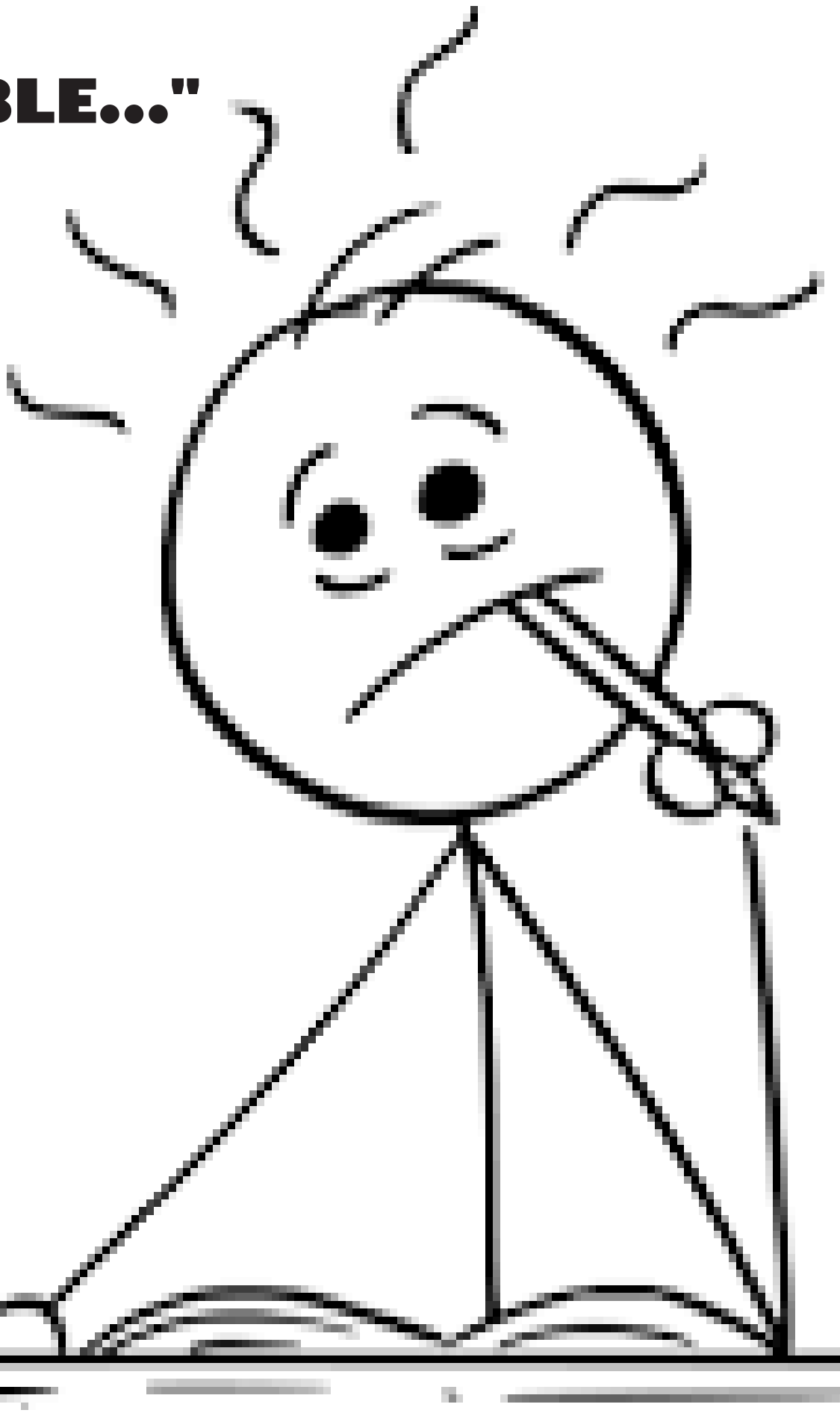
"Stop! Stop engine" - to cross your arms, the speed of this action corresponds to the degree of need to stop.

"Hang!" - arms to the side, palm down.

"Below" - wiggle down with straight arms, palms down.

“Above” - swaying upward with straight arms, palms upwards.

"IT'S IMPOSSIBLE..."



WHERE DOES THE THEORY BEGIN?

Engr. M.W.Qain

I first saw the inventor a long time ago, before the war. We lived in Baku, I was studying then in the fourth grade. One day, after returning from school, I noticed monitors in the courtyard, who were sadly smoking by the ruined transformer box. The wooden walls of the booth were broken, the assemblers sat on the boards and looked at the huge black transformer standing on a stone pedestal. The height of the pedestal was decent, more than a meter, and now, when the booth was removed, the transformer looked like a solid, impressive monument. The fitters were waiting for a crane to remove the old transformer and put a new one. That evening I was preparing lessons with a kerosene lamp. There was no light both in the second evening and in the third. Residents fussed around workers playing dominoes. The crane at that time was considered a rare and serious machine, it was not easy to wait for it. The fitters cursed faintly, and they themselves did not know when it was all over.

At first, however, I did not realize that this is an inventor. It was just a rumor spreading that a neighbor from the eleventh apartment, the accountant, would remove the transformer from the pedestal tomorrow. Almost all the tenants had nicknames, some were

respectfully called by name - “Uncle Kostya”, “Uncle Volodya”, and the accountant was the Accountant. Many years later, when I saw the artist Vitsin on the screen, I started: the poured out Accountant ...

The next day I ran away from the last lesson: I really wanted to see how the Account Officer would lower a huge transformer. I had time just in time. At the gate there was a supply of ice, and the assemblers dragged pieces of ice into the courtyard, to the transformer.

Here it is necessary to clarify something. In those years, there were no electric refrigerators. Every day - from spring to autumn - a cart with ice, bluish plates about twenty pounds drove from house to house.

The hostesses bought ice - the stove, half the plates, a quarter of the stove, crumbled it and stuffed wooden fridge cabinets. Or they just put ice in buckets and pots.

And now, for some reason, the fitters were dragging ice plates, and the Accountant was putting them down, and an ice cube quickly grew up next to the pedestal.

When both cubes - ice and stone - became of the same height, the Count Officer placed the boards on the ice, the assemblers moved the transformer with crowbars - slowly, centimeter by centimeter - from the stone pedestal to the ice. The ice squeaked, but the plates were laid neatly, the cube did not crumble, it stood.

The accountant himself covered the ice with a tarpaulin. And we stood and watched how water flowed from under a tarpaulin. At first it was a thin stream, then a real stream: the September sun in Baku works like a summer.

Everything in the courtyard, even the scandalous old man, nicknamed the Treasure (he insisted that he knew where the richest treasures were buried, but the trouble is there is no money for the road), everyone said that ice is a great idea. And Uncle Misha (now the Accountant was called by name) was sitting on a folding chair, reading a newspaper and from time to time, throwing off the tarp, carefully looked at the ice ...

In the morning I ran into the courtyard. The transformer went down half a meter, not less. It was Sunday, but the installers worked - they installed a new shield. From under the tarpaulin ran a clear stream of water. I was shocked. After all, everyone knew that the ice was melting, and I also knew this, but no one, not a single person, realized that the transformer could be moved onto the ice, and then everything would happen by itself, and the ice would smoothly lower the load to the ground. Why did Uncle Misha realize that this can be done, but we didn't guess? And also: ice, ordinary ice, which was only suitable for cooling, turned out to be

able to carefully lower its gravity. Probably ice can and much more. And not just ice. I suddenly had the idea that every substance can do anything.
It was here that the word came to me: invention. I realized that Uncle Misha made the invention and, therefore, he is an inventor. Maybe they will write about him in the newspapers. Especially if he comes up with how to raise a new transformer. I didn't have any suitable thoughts on this.
Unfortunately, a truck crane arrived on Monday. A new transformer was raised to the pedestal, and the old one was taken away.
The mechanics hooked up the light, the carpenters made a new booth, the painter painted it - and that was it. But I always remembered that in any, even the most hopeless situation, one can think of something, invent something, and this "something" will be very simple, unexpected and beautiful.
I made the first invention for which I was given a copyright certificate in the tenth grade. Then there were other inventions, work in the department of invention, meetings with various inventors. I was more and more interested in the mechanics of creativity: how inventions are made, what happens in the head of the inventor, why the idea of a solution suddenly appears? ..

Do you want to try to become an inventor? Please, here is your task.

Task 1. Beat or not to beat?

One day, the director of an electric-light factory assembled engineers and showed a pack of letters.

"Consumers complain, unhappy with our lamps," the director said sadly. - It is necessary to improve the quality of products. I think the whole point is that the gas pressure inside the finished lamp is sometimes more than the norm, sometimes less ... Who can say how to measure this pressure?

"Very simple," one of the engineers rose. - Take the lamp, break and ...

- We break ?! the director exclaimed.

- It is possible to break one lamp from a hundred for control, - the engineer did not give up.

"I would like to check every lamp," the director sighed. - Think, comrades engineers!

And then the inventor appeared.

"A challenge for schoolchildren," he said. - Open the tutorial ...

And he explained in which textbook one can read an almost ready answer to this task.

And what do you suggest? Do you have ideas - how to measure the gas pressure inside an electric lamp?

After sitting an hour or two above this task, you can make a list of five to ten ideas. Usually ideas are very weak. Often offer to weigh the lamp. Theoretically, everything is correct: knowing the weight of an empty lamp and the volume of its bulb, it is easy to weigh a lamp filled with gas and calculate the weight of the gas. And practically the decision is bad. Gas in the lamp is small - tenths or even hundredths of a gram. To catch a deviation from the norm, you need to know the weight to the nearest thousandths of a gram. We will have to weigh very carefully, measure the lamp and its parts - and this is in mass, continuous production! The release of lamps will slow down dramatically, and their cost will increase ...

Strong inventors also have bad ideas. But the strength of the strong is that they, having convinced that one solution is worthless, do not stop, but stubbornly continue to go through option after option. Man day and night thinking about the task. Everything that his eye falls on, he transfers to the task: is it possible to use it? It is snowing, cold ... but what if the lamp cools down? .. Gas becomes liquid, it will be easier to measure its volume ... With noise, an overloaded bus passed ... noise, sound ... and what if you "sound" the lamps ?

After all, the speed of sound depends on the density of the gas ... They show football on TV ... but what if you put a tiny ball in the lamp? The speed of its fall will depend on the density of the gas ... And so, day after day, month after month, year after year. Sometimes all my life. It also happens that life is not enough; other inventors pick up the baton, and the endless begins again: "And if you do this?" It happens that half way to solve a problem they are thrown: an unsolvable problem, what can you do ...
Imagine a researcher who says: “To achieve supersonic speeds, you need to study runners. What is the difference between a good runner and a bad one? study the runners, the machine that overtakes the sound cannot be built. We need other principles.

The method of trial and error originated in ancient times. In essence, he is the same age as man. Everything has changed during this time, and the person himself has changed, and the trial and error method has remained almost unchanged. Several years ago, Academician VL Ginzburg, responding to the questionnaire of the magazine "Inventor and Rationalizer", acknowledged that his inventions appeared "as a result of searching for options." The end

of the XX century, the world-famous scientist - and a search of options! Like two thousand, twenty thousand, two hundred thousand years ago ...

In short, you need to look for a completely different approach to solving inventive problems.

Technique develops naturally. It is not by chance that in different countries different inventors, solving the same problem, independently of each other come to the same answer. It means that there are regularities, they can be found and used to consciously solve problems - according to the rules, according to the formulas, without an "empty" bust of options.
There were, of course, skeptics: “How can everyone be taught to invent? This is impossible! ..” But I have been engaged in the theory of solving inventive problems for a year, not two, but all my life. At first he worked alone, then like-minded people appeared, at first there were few of them, only a few, then dozens, hundreds ... With common efforts, we managed to advance the theory quite far. Books were written, textbooks and problem books were compiled. Started working courses, seminars, schools. Now learning the theory of solving inventive problems is conducted in more than a

hundred cities. It turned out that invention can really be taught in the way that, say, physics, chemistry, or mathematics are taught. In 1978, students of Dnepropetrovsk State University passed the test on the theory of solving inventive problems. And two years later, in all technical universities of Ukraine a new academic subject was introduced - “Fundamentals of Technical Creativity”.

One can master the theory of invention at any age, but the earlier the training is started, the better the results will be. Like in sports. In essence, it is necessary to teach problem solving since kindergarten. And maybe from the creche. But we do not know how. The easiest way was to teach experienced engineers. Where the theory was lame, experience helped ... and the problem was solved. When the theory got stronger, we began to teach young engineers. Then they went to the students. Began to include in student groups of high school students. Since 1974, Pionerskaya Pravda began to publish inventive problems. The real "adult" tasks - like the problem of measuring the gas pressure inside an electric lamp. Thousands of letters came to the editor. We analyzed them, analyzed typical mistakes in the newspaper, explained a piece of theory - and again gave

tasks ...
No, we have not reached the nursery yet. At the level of the fifth or sixth grade, a barrier passes that has not yet been overcome. The fact is that in order to master the theory of invention, you need to know physics, even though the edge of physics is what you learn in the sixth grade. But in kindergartens and nurseries physics do not pass at all ... However, it is already clear how to overcome this barrier: it is necessary to work not with inventive, but with game tasks.

Imagine an empty room - only a doll lies on the windowsill. From the ceiling down two thin strings. It is necessary to connect, tie their lower ends - and it must be done by one person. If you take the end of one of the twines, you can not reach the other. Someone must file, reject the second twine. But the task is for one person, and there is no one to apply the second string ...

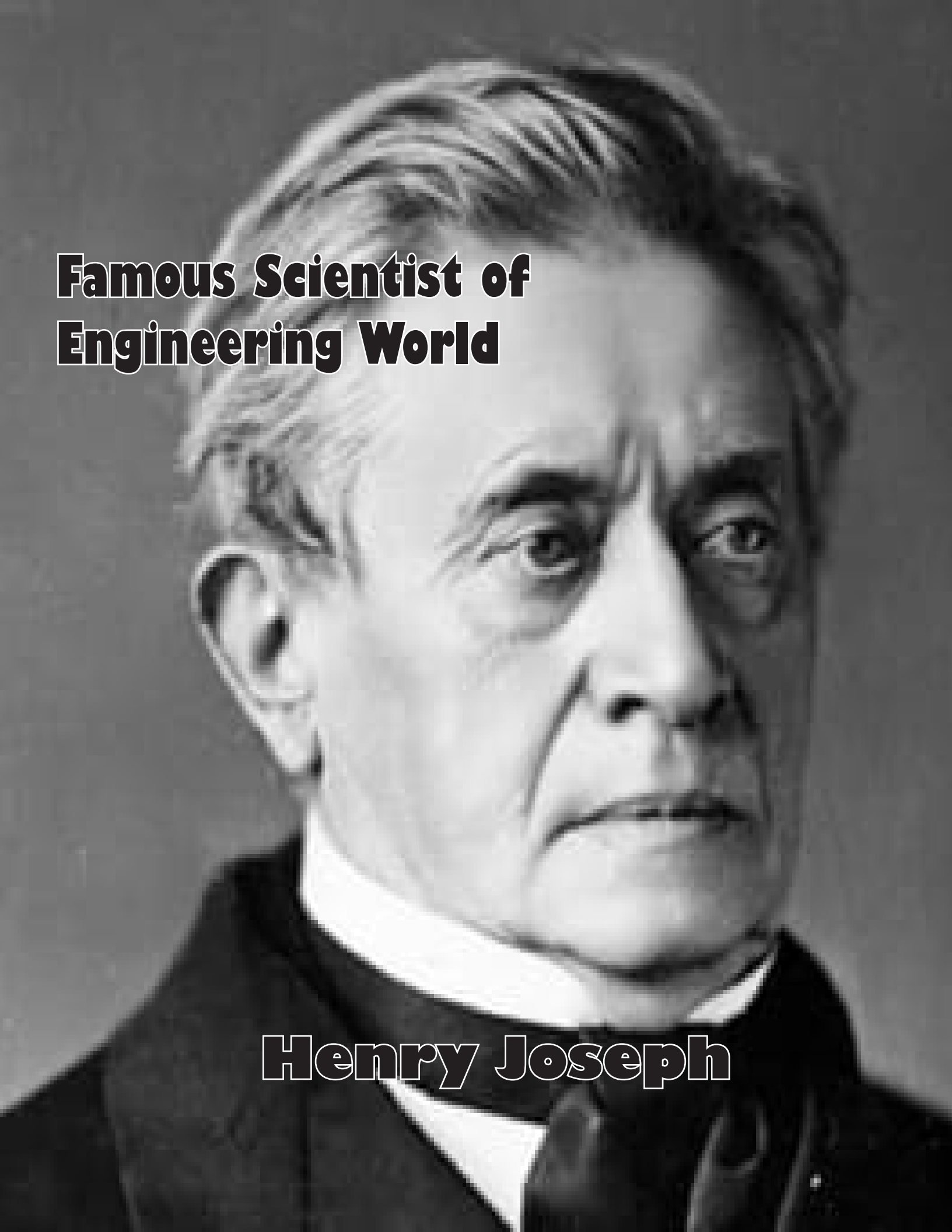
The solution is also available to kids who have no idea about physics. It is necessary to shake the second string. She herself does not swing - too thin. Therefore, it is necessary to suspend the load, the doll. That's all, the problem is solved!

You can complicate the conditions: let the balloons and a doll lie in the room. Balls are not suitable as a load, they are too light. But for some reason, it is the balls that attract the attention of those solving the problem; the doll is not immediately remembered. You can still complicate the task: remove all items from the room. Will the kid guess to take off the boot and hang it instead of the load? ..

As you can see, the task is not inventive ... and yet it is somewhat similar to inventive. What exactly is it like - we'll talk about it later. Now it can be noted that there is no blank wall between tasks related to different types of activities - in science, technology, art, etc. In this book we will mainly talk about invention. But the book is addressed to those who want to learn how to solve a variety of creative tasks.

Of course, this book is not a textbook. I just want to show that the solution of creative problems is an accessible to all, necessary and extremely exciting activity.

Famous Scientist of Engineering World



Henry Joseph

The inductance unit is named after the American scientist Joseph Henry.
He was born on December 17, 1799 in the small town of Albany in the state of New York. About his childhood, almost nothing is known. He studied at the local school, then became a teacher of mathematics and physics in it. Here at school, Henry began experiments on electromagnetism. He was the first to construct an electromagnet: he wound a coil on a horseshoe and discovered that if a current was passed through the coil, it would attract iron objects. This construction has been preserved to this day.
In the course of his experiments in 1830, Henry discovered the phenomenon of electromagnetic induction a year earlier than Faraday. But if Faraday immediately printed the results of his experiments (even then London was the scientific center of the world), then Henry in the distant American outback did not immediately, and therefore lost priority. Many years later, the American press repeatedly stated that Henry was a poor patriot (America missed such a discovery!) Nevertheless, Henry published the results of his experiments and was noticed. In 1832 he was invited to be a professor at New Jersey College, on the basis of which Princeton University was later formed. Continuing his experiments, Henry designed the first electromagnetic relay.
Now it was not far from the idea of the telegraph. And indeed, in 1835. in his laboratory, Henry demonstrated the first electric telegraph. He sent a message to the next building by wire. Again, Henry summed up modesty. He did not publish his results, and Samuel Morse, who invented it 2 years later, is now considered the inventor of the telegraph. At the same time, Morse (his engineering training was modest) did not hesitate to consult Henry on the technical issues of the telegraph and then immediately patented what Henry advised him. Experimenting over electromagnets, Henry created a design in which a group of electromagnets rotated on an axis. It was the first electric motor. Henry published this construction in 1840 (even though he did it!). True, he called this design modestly: "rotating electromagnet."
Continuing his research on electromagnets, Henry created samples with a load of up to 400 kg (this is in the middle of the nineteenth century!). In Washington, at the Smithsonian Institute, hundreds of Henry's experimental facilities are carefully stored. By the 40s of the 19th century, Henry became the most authoritative American scientist.
In 1846, the rich philanthropist Smithson founded the Smithsonian Institute - a system of scientific museums. Currently, the Institute includes 14 museums (natural history, aviation and astronautics, etc.). This very reputable organization in our time is located in the very center of Washington, near the Congress and the White House. Joseph Henry became the first director of the Smithsonian Institution; he remained at this post for 32 years before his death. From 1868 to 1878 Joseph Henry was president of the United States Academy of Sciences. Just at that time the young inventor Alexander Bell addressed him. He wanted to create a device for transmitting human speech through wires. Reading the works of Henry, Bell found a prototype of this device. For help, Bell turned to Henry and received such a consultation, after which he managed to implement his idea. This is how the telephone appeared, which Bell patented in 1876. After the death of Henry, Alexander Bell personally installed the telephone in the house of his widow and daughters.

Joseph Henry died on May 13, 1878 in Washington.

SANG-HOON KIM

ELECTRIC MOTOR CONTROL

DC, AC, AND BLDC MOTORS

Book For this Month

Electric Motor Control: DC, AC, and BLDC Motors introduce practical drive techniques of electric motors to enable stable and efficient control of many application systems, also covering basic principles of high-performance motor control techniques, driving methods, control theories, and power converters.

Electric motor drive systems play a critical role in home appliances, motor vehicles, robotics, aerospace and transportation, heating ventilating and cooling equipment's, robotics, industrial machinery, and other commercial applications.

The book provides engineers with drive techniques that will help them develop a motor drive system for their applications.

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